

Independent Evaluation of Recent Flooding in New Hampshire

First Public Meeting

December 12, 2007



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FEMA's Introduction

- Background (Federal Disaster 1695)
- Reason for Study



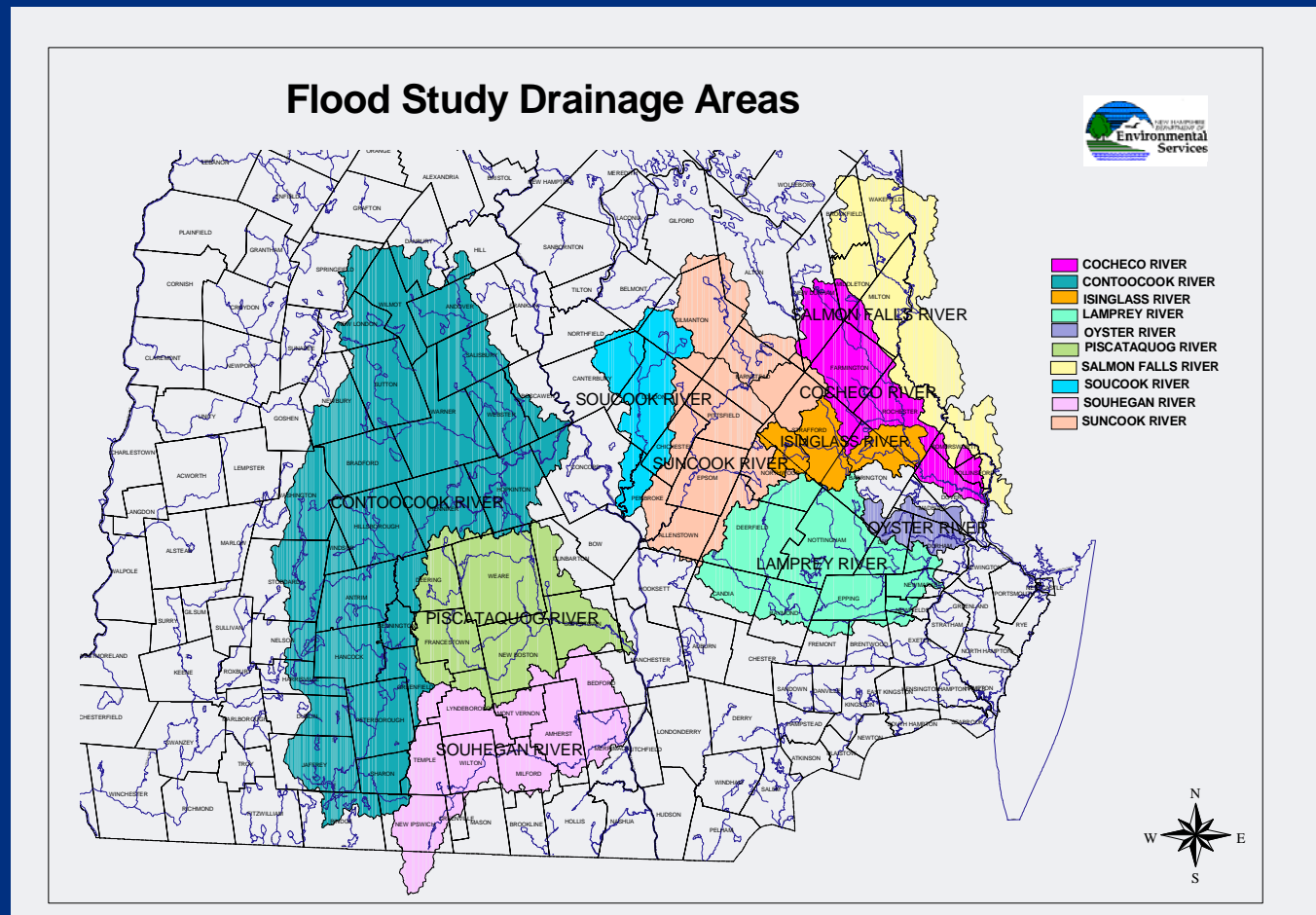
Agenda

- The purpose of this meeting – to learn from you
- The project team
- The independent review panel
- The proposed scope of work and schedule
- Introduction to some of the methods we'll be using
- Questions
- Informal break out sessions to solicit your input



The purpose of tonight's meeting

- To kickoff the project and to learn from you



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The project team

- FEMA
- URS Corporation
- Watershed Concepts and Riverside Technology
- Independent Review Panel
- The project team is responsible to FEMA



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Independent Review Panel

- Role of the Independent Review Panel
- Independent Review Panel Membership
 - Tom Sullivan, Gomez and Sullivan, Inc. (chair)
 - Will Thomas, Michael Baker Corporation
 - General Gerry Galloway (Ret.), PhD, University of Maryland



Project Scope

The purpose of the project is to investigate the flooding in May of 2006 and April of 2007 with three goals in mind:

- Quantify the differences between the two events (and other major events)
- Establish the role of dam operations by NHDES and other operators in the flooding.
- Establish ways to mitigate future flooding, which could be structural and non-structural in nature



We'll answer these questions:

- Why was the flooding higher in most locations in the April 2007 flood than the May 2006 flood, despite less rain?
- Had emergency operations started earlier, would the flooding have been less severe?
- In four basins, dam operations have been questioned. If they had been operated differently, would there have been less flooding?
- What would happen if the lakes in the basins were lowered more in the winter. Would the flooding have been less?



Project Scope – Focused basins

The project will focus on four basins:

- Piscataquog
- Salmon Falls
- Suncook
- Souhegan

These were selected because they were all basins in which the flood-affected communities had questioned the roles that dams may have played during the floods.



Project Scope – Additional basins

The following basins also will be investigated:

- Soucook
- Contoocook
- Cocheco
- Lamprey
- Oyster
- Isinglas



Methodology – data needed

■ Collect available data:

- Rainfall and snow
- Temperature
- River height and flow
- Reservoir and dam characteristics
- Reservoir and lake levels
- High water marks along rivers and streams
- Dam operation records

Data sources:

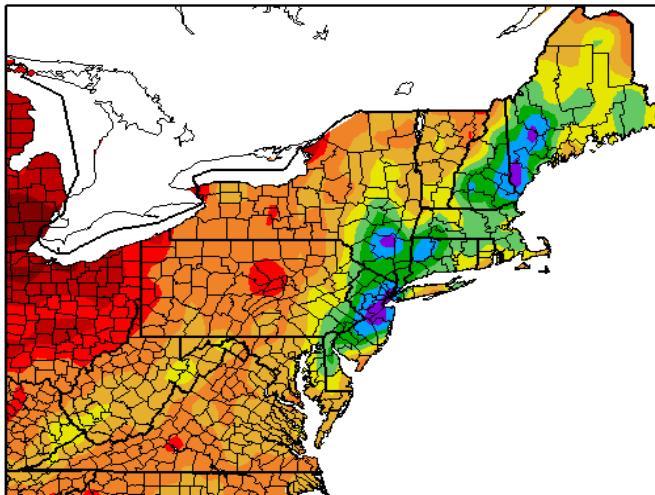
- You, the public
- National Weather Service
- USGS
- USACE
- NH DES
- Local dam operators



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Precipitation data

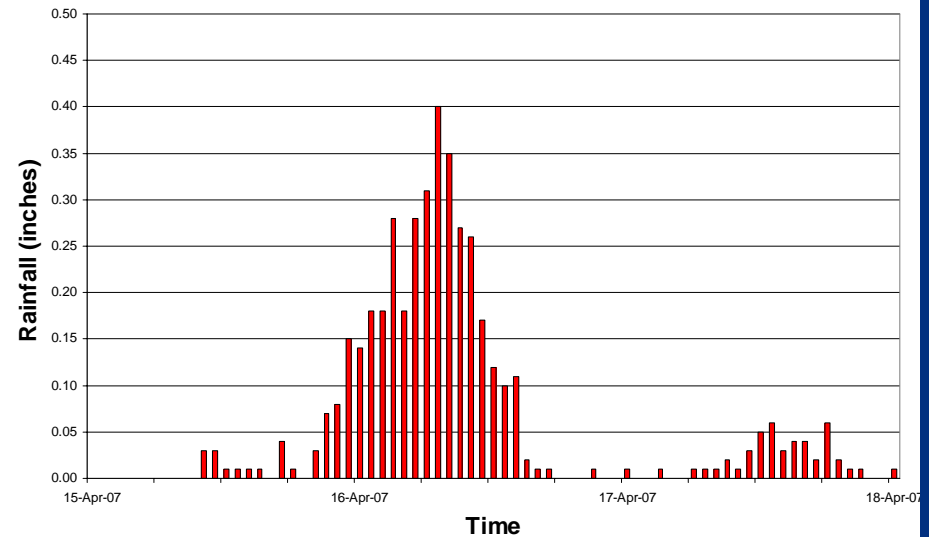
Precipitation (in)
4/13/2007 - 4/19/2007



Generated 4/20/2007 at HPRCC using provisional data.

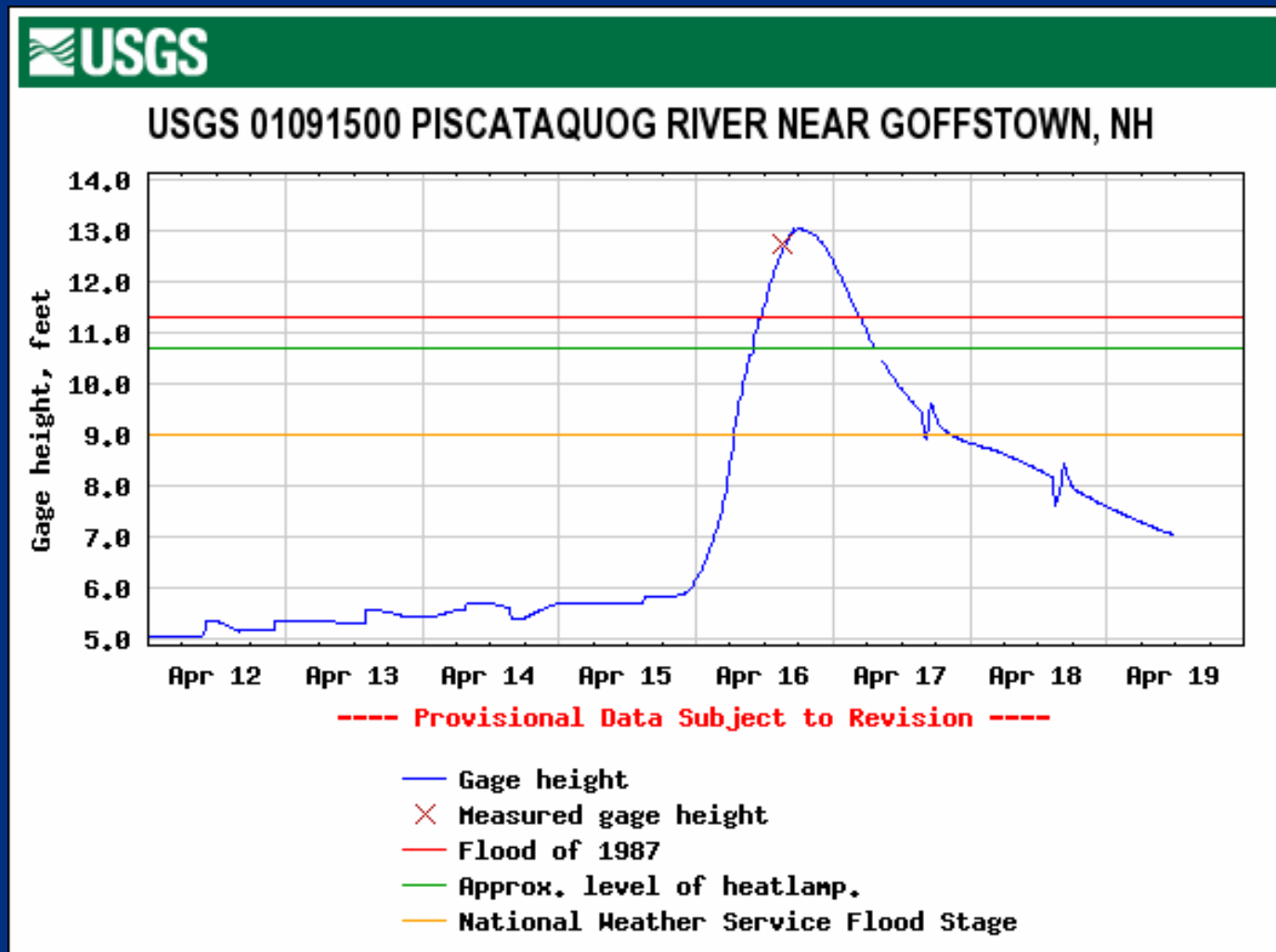
NOAA Regional Climate Centers

**Rainfall
Sunset Lake Dam**



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Hydrograph showing flood depth



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Methodology – initial conditions

How will we determine why the April 2007 storm generally caused more severe flooding than the May 2006 storm?

First, we will examine conditions leading up to the storms:

- How much water was in the reservoirs and lakes?
- How much snow was on the ground?
- The soil acts like a sponge. Was it relatively wet before the storms or relatively dry?
- What were the flow rates in the rivers before the storms?

We will be establishing what are called “antecedent moisture conditions”



Methodology – differences between storms

Second, we will examine the rainfall events themselves:

- What were the rainfall characteristics and how did they differ across the region, including:
 - Rainfall amount
 - Rainfall intensity
 - Rainfall duration
- What were the snowfall and snowmelt characteristics of the April storm



Methodology – depth of flooding

Third, we will review flood depths by obtaining “high water marks” collected during the storms



Methodology – dam operations

Fourth, we will examine:

- What are the dam operation procedures and policies
- How some of the dams were operated

With this information, we will determine why the April 2007 storm was more severe, our first project objective



Dam and reservoir simulations

How will we establish the role of dam operations by NHDES and other dam operators in the flooding?

- As mentioned previously, we'll focus on four basins where dam operations are suspected of causing increased flooding, including the following dams:
 - Piscataquog (Gregg Falls and Kelly Falls dams)
 - Suncook (Webster Mill, Buck Street, and Pittsfield Mill dams)
 - Salmon Falls (Milton 3-Ponds, Spaulding Pond, and Baxter Mill dams)
 - Souhegan (Otis Falls and Pine Valley dams)
- We'll use computer simulation models of these basins



Simulation models

What are computer simulation models?

- They are used to mimic the physical processes during storms to predict the rate of flow (“discharge”) in the rivers in the basins.
- First, we set the model up to make sure it can simulate what actually happened.
- Then, we have a tool we can use to see what would happen under different conditions. Specifically, we can look at dams and see what would happen if they were operated differently



Dam operating options

- Options for reservoir operations depend on type of dam.
- Simulation controls will be based on facilities at each dam.

Flood Control Dams

- Specifically build to prevent downstream flooding
- Large size
- Typically empty in-between storms
- Store floodwaters during a storm and release it afterwards



Run-of-the-River Dams

- Smaller dams in the river
- Often constructed as mill dams, now used for hydropower
- Often not used anymore



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Stoplogs

- Individual logs can be added or removed manually
- Once submerged, removal is often impossible



Flashboards

- Used to elevate the dam, typically 4 feet or less
- Are washed away when overtopped by too much water



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Gates

- Operated manually or remotely
- Gate opening can be changed during flooding
- Maximum Capacity



Powerhouse

- Flow through turbines can be regulated
- Maximum turbine capacity



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Dam and reservoir simulations

- We will use the models to find out:
 - What would have happened if emergency operations had begun earlier?
 - Many ponds and lakes in NH are seasonally lowered. What would have happened if they were kept lower longer?
 - At these dams, are there any logical modifications to gate/dam operations that would have resulted in less flooding?

Dam removal investigations

- Some of the dams in NH are old, and no longer used for their original purpose.
- We'll evaluate some of these dams to see if their removal would reduce upstream flooding without aggravating downstream flooding.

Dam management and planning

- We'll examine emergency protocols in other states and evaluate if emergency operation in NH can be improved.
- We'll specifically examine:
 - Coordination between jurisdictions
 - Communication protocols
 - Notification of the public downstream



Reports and Deliverables

- Interim Report – Summarize what happened and why; and provide draft recommendations. First week of March.
- Second Public Meeting – On or about the third week of March.
- Final Report – End of May
- Final Public Meeting – Beginning of June
- All reports will be reviewed by the Independent Review Committee and their comments will be incorporated.



Questions or Comments?
You can also send written
questions to FEMA:
ronald.lansverk@dhs.gov



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How the break-out sessions will work

